



## Syndromic Surveillance: What Data Users Need to Know

Syndromic Surveillance is near-real-time monitoring of disease indicators using automated data acquisition, processing and statistical alerts. Surveillance data can be used to monitor and detect changes in disease frequency and guide preventive measures in an attempt to reduce or eliminate morbidity and mortality. Syndromic surveillance is intended to complement—not replace—traditional case reporting. Syndromic surveillance is not intended to precisely identify individual cases of interest or concern. Figures generated using syndromic surveillance represent rough estimates of the burden of particular syndromes or conditions and should not be interpreted to be exact.

Historically, routine infectious disease surveillance relied upon laboratory confirmation and passive participation. Often, the lack of automated reporting mechanisms led to time delays within these processes. As a result, public health practitioners have been developing surveillance techniques that offer the potential for more timely epidemic detection. Earlier detection offers the best opportunity for implementing control measures so that the spread of disease may be minimized. In the past several years, new types of "health indicator" or "syndromic" surveillance systems have been developed. These systems are based on traditional data sources, such as outpatient diagnosis codes and emergency room chief complaint logs, and non-traditional data sources, such as over-the-counter drug sales and school absenteeism. By serving as surrogate health indicators, they may provide earlier insight about community health. These systems typically group acquired data into "syndromes", such as respiratory, gastrointestinal, or neurological. Since they make use of already existing electronic data sources that allow for rapid movement, quick manipulation, and automated analyses, they minimize additional burden on the health care system, and are more sustainable in the long term. Because of these features, syndromic surveillance may help with recognizing outbreaks at earlier stages, and accelerate the investigative process.

Rapid Health Information for Maine (RHIME) is the name of Maine's syndromic surveillance system. RHIME is a project of the Maine Center for Disease Control and Prevention (Maine CDC). RHIME currently contains three major data sources: emergency department visit data, ambulance run data, and death certificates.

### Emergency Department Data

Maine's hospital syndromic surveillance system collects information from hospital emergency departments and, in some cases, their affiliated urgent care centers. Maine CDC has 33 hospital emergency departments<sup>1</sup> participating in syndromic surveillance reporting approximately 2000 ED visits per day (depending on the time of year and other factors that affect patient traffic). Maine CDC is constantly working to improve the system so data are subject to change as additional facilities/data fields/facility types are added into the system.

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<sup>1</sup> Some hospital emergency departments use a single data feed to deliver information for visits at multiple facilities, including affiliated urgent care centers. For example, Maine Medical Center reports visits to the main ED on Bramhall Street in Portland in addition to the Urgent Care facility on Brighton Avenue. For the purposes of summarizing hospital engagement with syndromic surveillance, Maine CDC does not count these as separate hospitals.



Maine's syndromic surveillance system is still undergoing major development in data acquisition, surveillance techniques, and analysis methods. The system began in November, 2007 with the acquisition of daily flat files (one row of data per visit) from four hospitals. 21 additional hospitals were added to the flat file data stream between 2008 and 2012. Beginning in 2014, Maine CDC began acquisition of data via Health Level 7 (HL7) messaging. Hospitals that were previously sending data via flat file began transitioning to HL7 delivery and hospitals that had yet to send any data at all began sending HL7 data. Today, all of Maine's emergency departments are sending HL7 data. In general, the legacy flat-file data contains much less information about any given emergency department visit than the HL7 data does. For example, the flat-file data contains no diagnoses codes whereas most of the HL7 data does.

The quality of Maine's hospital syndromic surveillance data is limited by the quality of the source data. Data quality concerns can be divided into two categories: those that are known and quantifiable and those that are unknown and unquantifiable.

*Known, quantifiable data quality concerns:*

Hospitals face many technical and business challenges in extracting, transforming, and delivering syndromic surveillance data to Maine CDC. Some hospitals are able to deliver nearly all relevant information about a patient visit in near-real-time. Other hospitals are unable to reliably deliver important pieces of information. These data quality issues are quantifiable across hospitals. In general, we are concerned with the following measures of data quality:

1. Timeliness of data (e.g. how long does it take for information about a particular patient visit to be delivered to Maine CDC)
2. Representativeness of data (e.g. how complete is the data and to what extent does it represent all patient visits)

*Unknown, unquantifiable data quality concerns:*

Business processes, staffing, and information technology (IT) systems, especially electronic medical record systems (EMRs) vary widely across Maine hospitals and are constantly changing. Variation in these business and IT factors across facilities and over time can systematically affect the data that hospitals send to Maine CDC and result in systematic (non-random) bias in the results of analysis using Maine CDC's syndromic surveillance system. Consider, for example, that staff at one hospital may use a significantly different set of guidelines or norms or standards for translating a patient's chief complaint into their medical record. Some hospitals may be choosing from a list of pre-set values when entering data, while others may enter text values freely. Hospitals may also change these processes through slow evolution in practices or wholesale changes in management, staffing, or IT infrastructure. Any analysis that attempts to compare the burden of particular syndromes or conditions across geographic areas or over time can be biased by these types of differences.

Emergency Medical Services (EMS) (Ambulance Run) Data

Maine CDC's EMS syndromic surveillance system receives data from Maine EMS, a bureau of the Maine Department of Public Safety. Maine EMS collects the data from Maine-based ambulance service providers. Maine EMS has approximately 200 ambulance service providers reporting approximately 650

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EMS incidents per day (depending on the time of year and other factors that affect incident counts). Maine CDC is currently working to reconfigure the process by which it acquires, processes, and analyzes data from Maine EMS. This reconfiguration will provide additional data elements for EMS incidents, including administration of naloxone/narcan and other detailed information about patient disposition and transport.

#### Death Data

Maine CDC's death surveillance system receives data from the Maine Office of Data, Research, and Vital Statistics (ODRVS). Maine CDC receives data about individual deaths as death certificates are recorded in the ODRVS database. Maine records approximately 13,000 deaths per year.